

# AFDC UPDATE

News of the Alternative Fuels Data Center

## Spirit FFVs Pass Emissions Tests

Preliminary emissions test results on conventional and flexible fuel Dodge Spirits show that both models surpass the U.S. Environmental Protection Agency's (EPA) emissions requirements when running on methanol or reformulated gasoline (RFG).

The carbon monoxide (CO), hydrocarbon (HC), and oxides of nitrogen (NO<sub>x</sub>) emissions for both conventional and flexible fuel Dodge Spirits were consistently low when operating on either methanol blends or RFG, according to research done by Automotive Testing Laboratories (ATL). Whether operating on gasoline or alcohol, the Dodge Spirits performed below the EPA emissions standards.

The Spirits appear to have similar emissions despite design and engineering differences between the flexible fuel vehicles (FFVs) and conventional vehicles. Moreover, testing revealed that emissions were constant when similar models operating under



An FFV undergoes emissions testing as AFDC Manager Dr. Robert Wooley looks on.

varying fleet conditions were compared.

"Historically, AFVs [alternative fuel vehicles] have not undergone as much extensive engine research and development as conventional gasoline vehicles," according to National Renewable

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## EPA Issues Final Gaseous Fuel Emissions Standards

The U.S. Environmental Protection Agency (EPA) has issued its final rule on "Standards for Emissions From Natural Gas-Fueled Vehicles and Motor Vehicle Engines, and Certification Procedures for Aftermarket Conversion Systems."

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## AFDC Offers New Platform Independent Option for Retrieving Data

In a continuing effort to help the public gain access to alternative fuels data, the U.S. Department of Energy's (DOE) AFDC is offering you another option—*AFDCMenu*—to access alternative fuels data. Now you can gain access to data via three methods:

- (1) *AFDC/View* for Windows;
- (2) Oracle's *Data Query*; and
- (3) *AFDCMenu*.

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## Spirit FFVs Pass Emissions Tests

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Energy Laboratory Project Engineer Ken Kelly. "Nonetheless, this preliminary research indicates that AFVs are competing at the same emissions levels."

"These preliminary test results will be used as a base from which to analyze these vehicles in the future," said ATL's Scott McKinniss. "Although this study indicated positive results for the FFVs, more testing is required to evaluate emissions benefits of differing fuel types and overall vehicle emission deterioration."

The vehicles are expected to undergo testing every 10,000 miles. However, in this round of testing, odometer readings varied from 4,000–20,000 miles for the Spirits.

ATL tested 16 methanol FFV Spirits that underwent 20 emission tests on a variety of methanol and gasoline blends (85% methanol and 15% gasoline, 50% of both gasoline and methanol, and 100% RFG). Eighteen tests were performed on 14 conventional gasoline Spirits using RFG.

Each test included the federal test procedure (FTP) and an IM-240 (inspection and maintenance test). (Both tests identify tailpipe emissions; however, the IM-240 test is done with a hot engine for a duration of 240 seconds.)

ATL has performed similar tests on a small fleet of E85 (85% ethanol, 15% gasoline) and conventional gasoline Chevrolet Lumina's. All the test data for the Spirits and Lumina's can be found in the AFDC. When using *AFDC/View*, search under "Emissions Data," then "Alcohol LDV FTP Average Emission Results." If logged into the AFDC, run *AFDCMenu* and search "EMISS," then "AL LDV Emiss." □

## Emissions Data Show Varied Results on 1992 CNG/Gasoline Conversions

Emissions tests on 1992 Ford Crown Victorias, converted to run on either compressed natural gas (CNG) or gasoline, showed these vehicles did not meet all federal and California emissions requirements. Test results were compiled on five police vehicles at Tinker Air Force Base (TAFB) in Oklahoma and submitted to the AFDC by the National Institute of Petroleum and Energy Research (NIPER).

Although the Crown Victorias met Environmental Protection Agency (EPA) standards directly following conversion, these vehicles showed marked increases in carbon monoxide (CO) emissions after they had been in use for more than 11,000 miles. "Since the

vehicles failed to meet the standard on either CNG or gasoline, even with the CNG system disconnected, it is likely that there are problems with the vehicles' emission control systems as well as the CNG conversion systems," according to NIPER Manager of Fuels/Engines Research Dr. Raymond P. Anderson. The CO problem was related to deactivation of the catalyst, which may have happened in a number of ways, explained Anderson. (Catalyst deactivation is usually caused by excessively high temperatures, which result from burning high concentrations of fuel in the catalyst. Large quantities of

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## EPA Issues Final Gaseous Emissions Standards

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The rule provides emission standards and test procedures for the certification of new natural gas and liquefied petroleum gas-fueled light-duty vehicles, light-duty trucks, heavy-duty engines, and motorcycles.

According to the agency, the rule should "provide a comparable degree of environmental protection to that afforded by standards applicable to gasoline, diesel and methanol vehicles, and to ensure that aftermarket conversions do not degrade the emissions performance of the vehicles or engines being converted." The rule establishes nonmethane hydrocarbon standards for natural gas

vehicles rather than a total hydrocarbon standard.

The provision does not mandate certification for all aftermarket kits. However, for certified conversion kits, it does require those conversions to generate emission reduction credits in order to be certified.

The conversion emission regulations are effective with the 1997 model year, but manufacturers have the option to certify before then. These regulations also include details for the control of refueling emissions outlined in the *Federal Register* notice (September 21, 1994). □

## Varied Results on 1992 CNG/Gasoline Conversions

(continued from page 2)

unburned fuel in the exhaust from the engine can be caused by ignition system and fuel metering system malfunctions.)

In addition, when running on CNG, the vehicles tended to exhibit higher nitrogen oxide (NO<sub>x</sub>) emissions than before conversion, although still within federal standards. The cause of higher NO<sub>x</sub> emissions when running on CNG relates to a "tendency for CNG systems to control the air/fuel mixture on the lean side of stoichiometric leaving free oxygen in the exhaust, which impairs the ability of the catalyst to reduce NO<sub>x</sub>," said Anderson. Higher NO<sub>x</sub> may be a correctable problem with improved technology, he added. This was supported by Randy Chen, Manager of ADP Systems for IMPCO, the manufacturer of the conversion kits installed on the two Crown Victorias in 1992. The 1994 model-year kits, according to Chen, have computer reprogramming that allows for lower emissions overall, including NO<sub>x</sub>, while simultaneously improving driveability and fuel economy.

The CNG Crown Victorias also exhibited higher total hydrocarbon (THC) emissions, largely related to increases in methane. Nonmethane hydrocarbon (NMHC) emissions results, nonetheless, were well within California standards for all five vehicles.

"Exhaust emission rates for the vehicles before conversion were all very low, well below both EPA and California standards," emphasized Anderson, who commented that the vehicles originally met strict California standards for transitional low emission vehicles.

The testing project was sponsored by the U.S. Department

**Table 1**  
**Results of Emission Tests on Two**  
**1992 Ford Crown Victorias**  
**Before and After Conversion (Grams Per Mile)**

Kit Type or Vehicle #	Before/After Conversion	Fuel	HC g/m	NMHC g/m	CO g/m	NO <sub>x</sub> g/m	Odom.
'92 EPA Strnds	-	All	0.41	NA	3.4	1.0	-
'92 CA Strnds	-	All	0.41	0.39	7.0	0.4	-
#212	BC	CERT	0.13	0.10	1.13	0.20	208
#212	BC	CERT	0.11	0.09	1.04	0.18	220
IMPCO	AC	CNG	0.50	0.07	2.01	0.31	773
IMPCO	AC	CNG	0.50	0.03	2.04	0.36	788
IMPCO	AC	CERT	0.35	0.32	1.97	0.21	819
IMPCO	AC	CERT	0.12	0.09	1.69	0.28	863
IMPCO	AC	CERT	0.29	0.24	12.00	0.48	11,626
IMPCO	AC	CNG	0.75	0.10	13.25	0.19	11,649
#212	UC	CERT	0.26	0.22	5.03	0.55	12,061
#213	BC	CERT	0.10	0.08	0.59	0.28	202
#213	BC	CERT	0.11	0.09	0.70	0.25	215
IMPCO	AC	CNG	0.62	0.09	0.79	0.55	843
IMPCO	AC	CNG	0.58	0.09	0.54	0.64	870
IMPCO	AC	CERT	0.13	0.10	1.24	0.28	903
IMPCO	AC	CERT	0.13	0.11	1.67	0.31	914
IMPCO	AC	CNG	1.04	0.15	12.28	0.30	14,338
IMPCO	AC	CERT	0.38	0.33	10.79	0.54	14,357

BC = Before Conversion      CERT = UPA Certified Gasoline  
 AC = After Conversion      CNG = Compressed Natural Gas  
 UC = Unconverted (i.e., removed CNG system)

Source: NIPER

of Energy (DOE), and is part of a larger effort to collect data on CNG/gasoline conversions installed on vehicles in use at TAFB. The purpose of the project, according to Anderson, has been to collect "real world data" on vehicles that are actually in operation.

Crown Victoria vehicle data in Table 1 may be accessed through the AFDC by searching "Emissions/Tinker AFB/Passenger Car" using AFDC/View or AFDCMenu. □

*For more information about articles in this publication, or to become an AFDC user, please contact the National Alternative Fuels Hotline at 800-423-1DOE, P.O. Box 12316, Arlington, Virginia 22209.*

## New Platform Independent Option for Retrieving Data

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*AFDCMenu* is similar to *AFDC/View* for Windows in that it offers you access to all the data available to *AFDC/View* for Windows, while also allowing you to customize queries. The main advantage of *AFDCMenu* is that it is platform independent—your computer need only emulate a VT100 terminal and have a modem or access to Internet. To achieve platform independence, *AFDCMenu* does not provide graphic capabilities. If graphics are desired, you should transfer any output file(s) to your PC and run the graphics/spreadsheet software with which you are familiar. *AFDCMenu's* other advantage is its simplicity of use relative to *Data Query*, for example, which gives you flexibility and depth. However, if you have little experience in dealing with data base structures, you may find *Data Query* to be somewhat cumbersome.

You may be interested in using *AFDCMenu* if you are:

- (1) without Windows capabilities;
- (2) on a network that allows sharing of a modem;
- (3) a Macintosh user; or
- (4) an Internet user.

As with all AFDC software, *AFDCMenu* requires a user ID and password to access the AFDC. You can obtain your own user ID and password by calling the National Alternative Fuels Hotline at 800-423-1DOE. If you are already using the AFDC, you have a user ID and password and need not apply for a different ID and password to use *AFDCMenu*.

To use *AFDCMenu*, access the AFDC computer through a modem (303-275-4199) or the Internet (telnet to `afdc.nrel.gov`, IP address is 192.48.125.16); log in; enter 'go' at the `afdc>` prompt for a

## Downloading Files from AFDC (Non-Internet Users)

When you have created output files as a result of running software such as *AFDCMenu* or *Data Query*, you may want to transfer (download) the information (file) to your PC. To execute the file transfer operation, enter **download** (must be lower case) or choose the download option from the menu created from the 'go' command. On your PC, the binary transfer choice (e.g., Kermit or Xmodem) must be selected to be compatible with the choice made in the file transfer utility screen of **download**. Once you have chosen a file to download from the AFDC

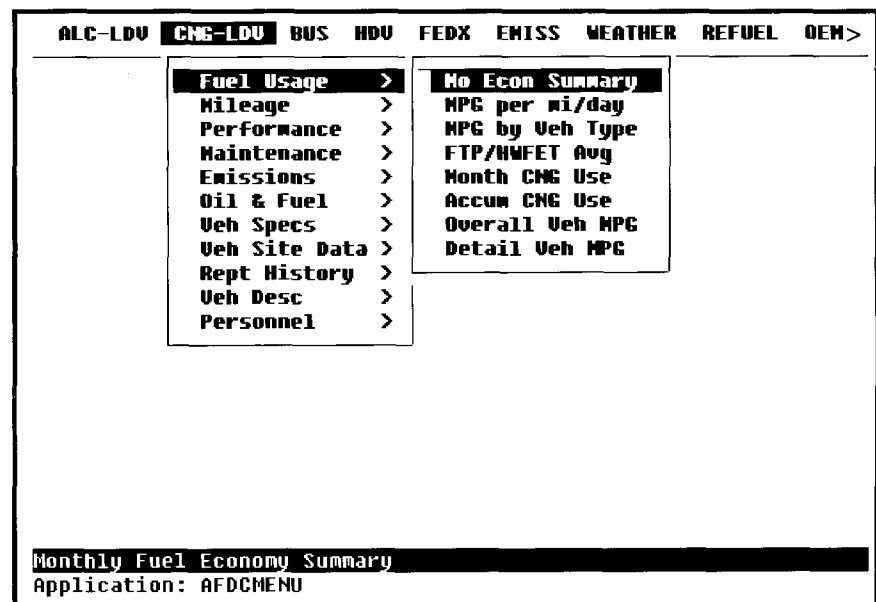
computer, you must set the receiving transfer mode on your PC to **RECEIVE BINARY**. At this time, the transfer will take place automatically. □

[Note: When accessing the AFDC directly, you should watch for log-on messages and navigate the menu (accessed by typing 'go') for new options, applications, help, and documentation. *AFDC/View* users should check the "Hot Topics" and the "Software Update Information" icons under the "AFDC Update Information" icon.]

menu of choices; and choose *AFDCMenu*. The selection menu also lists other options available to you. You can download an

*AFDCMenu* manual from the AFDC. Figure 1 shows a sample screen of *AFDCMenu* selection criteria. □

**Figure 1** A view of *AFDCMenu* choices.



## Accessing the AFDC through Internet

Internet users may gain access to the AFDC by connecting to the host via **telnet afdc.nrel.gov** (or telnet 192.48.125.16). When logging in to the AFDC, Internet users will be prompted to give a user ID and password (call the Hotline at 800-423-1DOE if you need these). Once connected, users may retrieve data and perform other options by navigating the menu of choices (accessed by typing 'go').

The advantages of using Internet to access the AFDC are (1) platform independence—you need only be able to emulate a VT100 terminal; (2) access to all queries through *AFDCMenu* as soon as they are available; (3) access to the data base across most operating systems; and (4) no direct long distance phone charges. Access to the AFDC information through Internet is made easier with the release of *AFDCMenu* (see article on page 1).

In addition to accessing the AFDC data base over Internet, *AFDC/View 2.0* software can be updated by replacing certain files using the **download** command (see article on page 4). □

*For Internet users with Mosaic, all the back issues of the AFDC Update and refueling site maps are now available. You can do simple key word searches for specific articles or topics. If you are interested in accessing this information, the Mosaic URL address is <http://afdc.nrel.gov/>.*

## DOE, NREL, and Los Angeles MTA Offer New Methanol Video

A 14-minute videotape, *Traveling Safe With Methanol*, is now available to the public. The U.S. Department of Energy (DOE), the National Renewable Energy Laboratory (NREL), and the Los Angeles County Metropolitan Transportation Authority (L.A. MTA) collaborated on the project, which features actress Pam Dawber.

According to a U.S. Environmental Protection Agency (EPA) test performed in the video, fire-related accidents, injuries, and deaths can be reduced by as much as 90% by using methanol vehicles instead of gasoline vehicles. The EPA found that methanol vehicles emit less heat and vapor, M85 (85% methanol, 15% gasoline) fires are more easily contained, and M85 flames can be extinguished with water.

The video also provides information about the uses,

properties, safety procedures, refueling processes, storage methods, and potential long-term benefits associated with methanol.

"Methanol is a very clean-burning fuel, much cleaner than gas[oline], and, in heavy-duty applications, much cleaner than diesel," according to L.A. MTA Director of Advanced Technology Rich Davis, who was interviewed in the video.

The video outlines several long-term advantages of methanol. The fuel can reduce hydrocarbon exhaust emissions in cities with smog problems, particulate emissions by as much as 90%, and nitrogen oxides by 30%–60%, according to Richard Moorner of DOE's Office of Transportation Technologies. □

*For a free VHS copy of the video, contact the Alternative Fuels Hotline at 800-423-1DOE.*



*A consumer refuels an M85 vehicle.*

## EPACT Update: Upcoming Rulemakings and Reports

### **Minimum Federal Fleet Requirement: (Sect. 303):**

Describes minimum federal fleet requirements for alternative fuel vehicle (AFV) acquisition as 5,000 light-duty AFVs by fiscal year (FY) 1993, 7,500 by FY 1994, and 10,000 by FY 1995. On April 21, 1993, President Clinton released an executive order (No. 12844) requiring that the federal government exceed the Energy Policy Act of 1992's (EPACT) federal AFV purchase requirements by 50%. With this order, the federal government's expected AFV purchases increased to 11,250 in FY 1994 and 15,000 by FY 1995. **Status:** By the end of FY 1994, the federal government will have acquired a total of 17,087 AFVs, including almost 10,000 vehicles that run on 85% methanol and 15% gasoline (M85) and more than 5,276 compressed natural gas (CNG) vehicles.

### **General Services Administration (GSA), United States Postal Service (USPS) (Sects. 310, 311):**

Requires GSA and USPS to report to Congress every two years (starting in 1993) on their progress with AFVs. **Status:** So far, GSA has purchased more than 9,100 M85 vehicles, about 100 that run on 85% ethanol and 15% gasoline (E85), and more than 5,000 CNG vehicles. Many of the flexible fuel M85 vehicles are running on gasoline because of the lack of M85 refueling stations. GSA's first report in 1993 is available free to the public through GSA; call 703-305-6278. USPS has converted more than 3,000 CNG vehicles and is experimenting with using other alternative fuels in the fleet as well. You can obtain a copy of the USPS report to Congress on its AFV program by calling 703-280-7851.

### **Public Information Program (Sect. 405):**

Requires an information package to assist consumers and give detailed information on AFVs, fuel characteristics, and conversion information. **Status:** To meet this requirement, Argonne National Laboratory (ANL) recently released the brochure *Taking An Alternative Route*, which is currently being distributed to fleet owners and the public. Later this year, ANL will release a brochure called "Fast Fuel Facts" and additional fact sheets as part of this program.

### **Labeling Requirements (Sect. 406):**

Requires the Federal Trade Commission (FTC) to establish uniform labeling standards for alternative fuels and AFVs. **Status:** In May, the FTC proposed that standard labels include common names of the fuels, each fuel's principal component, fuel tank capacity, and other factors consumers should consider. The labels should also reference additional sources of objective information. The final rule is expected by April 25, 1995.

### **State and Local Incentives Programs (Sect. 409):**

Includes a call for comprehensive state plans detailing alternative fuel incentive programs that will qualify the state for federal assistance. **Status:** The Notice of Proposed Rulemaking (NPR) is expected in late 1994 with the final rule planned for mid-1995. To accelerate the introduction of AFVs, DOE has allocated \$1 million for 6-10 state government AFV demonstration programs. Recipients will be announced later this year.

### **Alternative Fuel Bus Program (Sect. 410):**

Proposes that the U.S. Department of Transportation (DOT) may enter cooperative agreements or joint ventures with urban planning authorities for a demonstration project of alternative fuel urban buses and other mass transit programs. Also under this section, DOT may provide financial assistance for the incremental costs of purchasing dedicated alternative fuel school buses. DOE and other partners will provide technical assistance as needed. **Status:** Currently no funding has been appropriated for these projects.

### **Certification of Training Programs (Sect. 411):**

Requires DOE to establish and implement a national certification program to certify training programs for technicians who install retrofit systems to convert vehicles to AFVs, and who maintain and repair AFVs and refueling stations. **Status:** DOE is currently working with stakeholders to develop the training certification program. The certification programs for CNG and LPG technician training are expected to begin in the spring of 1995.

### **Alternative Fuel Use in Non-Road Vehicles and Engines (Sect. 412):**

Requires DOE to assess the potential of alternative fuels in non-road vehicles and engines (including those used for commercial transportation at airports and in marine engines) to reduce reliance on imported oil. **Status:** A report on the study is currently in draft form; a final version is expected in late 1994.

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## EPACT Update *(continued from page 6)*

### **Mandate for Alternative Fuel Providers (Sect. 501):**

Mandates fuel providers to acquire AFVs starting with 30% of new purchases in model year 1996, 50% in 1997, 70% in 1998, and 90% in 1999. This section includes an exemption for electric utilities until 1998. **Status:** An NOPR is expected in late 1994.

### **Replacement Fuel Supply and Demand Program (Sect. 502):**

Requires DOE to estimate domestic and foreign production capacities for replacement fuels and AFVs needed to meet EPACT's goals. Under this section, DOE is to determine the technological and economical feasibility of replacing 10% of traditional fuels by 2000 and 30% by 2010, with at least half of the replacement fuels from domestic sources. DOE must determine the best means and methods to increase U.S. production, and report on greenhouse gas emissions implications of the replacement fuels. **Status:** A draft was released last April, and a final report is due in late 1994.

### **Replacement Fuel Demand Estimates and Supply Information (Sect. 503):**

Requires DOE to estimate annually the numbers and geographic distribution of each type of AFV in use in the United States, amount and distribution of each type of replacement fuel, and greenhouse gas emissions produced from the use of each replacement fuel. Fuel suppliers and AFV manufacturers must provide DOE with information concerning fuel supplies and AFV production.

**Status:** DOE's Energy Information Administration released the first of these reports, *Alternatives to Traditional Transportation Fuels: An Overview* in June 1994.

### **Fleet Requirement Program (Sect. 507):**

Includes requirements for non-federal fleets to acquire AFVs and sets 10% and 30% AFV replacement goals by the years 2000 and 2010, respectively. As written in EPACT, light-duty fleets not otherwise covered in Section 501 will be mandated to make 20% AFV purchases in model years 1999–2001, 30% in 2002, 40% in 2003, 50% in 2004, 60% in 2005, and 70% in 2006. Sect. 507 also sets forth mandatory state fleet programs starting at 10% of new fleet purchases in model year 1996, 15% in 1997, 25% in 1998, 50% in 1999, and 75% thereafter. For greater flexibility, DOE may allow states to propose a voluntary light-duty AFV plan to meet the percentages without relying solely on new state-owned vehicles. **Status:** Testifying before Congress, DOE Assistant Secretary for Energy Efficiency and Renewable Energy Christine Ervin stated that the private/local fleet program is probably necessary but not sufficient to meet the EPACT fuel replacement goals of 30% by 2010. An advance NOPR is expected in early 1995.

### **Credits (Sect. 508):**

Provides a credit allocation and trading program for early and excessive light-duty AFV purchases. The credits can then be sold to another covered fleet. Local and private fleets can acquire credits for purchases that started in October 1992, but the credits cannot apply until the final rule is made. **Status:** Proposal for Section 508 is included as part of the rulemaking for the Alternative Fuel Transportation Program. Publication is expected in late 1994.

### **Program and Solicitation (Sect. 611):**

Requires DOE to conduct a demonstration program of electric vehicles (EVs) and associated EV equipment. **Status:** There is currently no funding for this project.

### **Electric Utility Participation Study (Sect. 625):**

Requires DOE, in consultation with appropriate federal agencies, state regulatory commissions, and electric utilities, to conduct a study to determine how electric utilities may invest in, own, sell, lease, service, or recharge batteries for EVs. **Status:** DOE is currently reviewing a study that looks at incentives to market EVs. This is the first step in a study to determine how electric utilities can be involved in the EV market. □

*For more information on any of these sections,  
please contact the  
National Alternative Fuels Hotline at  
800-423-1DOE.*

## Recent and Upcoming Meetings and Conferences

**October 17-20:** 1994 SAE Fuels & Lubricants Meeting & Exposition, Harborplace Hotel, Baltimore, MD. For information, call SAE International at 412-776-4970, or write Engineering Meetings Division, SAE, 400 Commonwealth Drive, Warrendale, PA 15086-9905.

**October 24-27:** Annual Automotive Technology Development Contractor's Coordination Meeting, the Ritz-Carlton, Dearborn, MI. Sponsored by the U.S. Department of Energy. For information, call Conference Management Associates, Inc. at 703-754-0066; fax: 703-754-4261 or write to: Conference Management Associates, 1401 Spring Lake Drive, Haymarket, VA 22069-1008.

**October 31-November 4:** International Dedicated Conference on Electric, Hybrid & Alternative Fuel Vehicles, Aachen, Germany. For information, call 081-681-3069 (England) or write to: International Symposium on Advanced Transportation Applications, 42 Lloyd Park Avenue, Croydon, CR0 5SB, England.

**November 15-17:** Utility Fleets Expo, Charlotte Convention Center, Charlotte, NC. For information, call Jack Stover at 708-639-2200, or write to: Utility & Telephone Fleets Magazine, P.O. Box 183, Cary, IL 60013.

**November 28-December 1:** Fuel Cell Seminar, San Diego, CA. For information, call Annmarie Pittman at 202-639-4994, or write to: Courtesy Associates, Inc., 655 15th Street, N.W., Suite 300, Washington, DC 20005.

**December 5-7:** The 12th International Electric Vehicle Symposium (EVS-12) and Electric Vehicle Exposition, Disneyland Hotel and Convention Center, Anaheim, CA. Call 415-855-8799, or write to: Pat Turner, P.O. Box 1041, Palo Alto, CA 94303.

All upcoming events cannot be listed because space is limited. If you need a detailed listing of conferences and events, please contact the National Alternative Fuels Hotline at 800-423-1DOE.

*Published by the Alternative Fuels Division of the National Renewable Energy Laboratory: 1617 Cole Boulevard, Golden, CO 80401-3393. NREL is a national laboratory of the U.S. Department of Energy. The National Alternative Fuels Hotline number is 800-423-1DOE. NREL/SP-425-7146*

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